

**REMARKS**

Claims 1-41 are all the claims pending in the application.

**The Present Invention**

The presently claimed invention relates to a process for producing a fibrous material having a modified structure comprising a lignocellulosic matrix with phenolic or similar structural groups which are capable of being oxidized by oxidizing agents and a modifying agent, said process comprising the steps of oxidizing phenolic or similar structural groups of the lignocellulosic matrix to provide an oxidized fibre material, and contacting the oxidized fibre material with a modifying agent containing at least one first functional portion, which is compatible with the oxidized fibre material, said modifying agent being capable of providing the lignocellulosic fibre material with properties foreign to the native fibre.

**Response to Claim Rejections under 35 U.S.C. § 112**

Referring to page 7 of the Office Action, claims 22 and 40 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. In particular, the Examiner indicates that the definition of “nkat/g” is indefinite.

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

At page 8 of the Action, the Examiner states:

In general activity values are measured in comparison to a standard set of assay conditions not a set of conditions which changes based on variable temperatures/pH's [see e.g. Units of Enzyme Activity pg. 319 #1]. Since the Applicant gives variable temperatures/pHs that can be used, the definition of nkat/g is also necessarily variable and indefinite.

The Examiner's argument fails to distinguish between two distinct senses of activity value. In “Chapter 4 (Enzyme Units) of *Enzyme Nomenclature: Recommendations 1964* of the

International Union of Biochemistry” of *Units of Enzyme Activity* at page 319, a standard unit of enzyme activity is defined as that amount which will catalyze the transformation of 1 micromole of the substrate per minute under standard conditions. It is noted that Pederson calculates laccase enzyme activity in micromol per minutes.

According to *Units of Enzyme Activity*, the katal was introduced at the same time to define a new unit of enzyme activity. Particularly, the katal is used to express catalytic activity, and its numerical quantity value depends on the experimental conditions. *Units of Enzyme Activity* pg. 319 discloses that katal enzyme activity is the property measured by the increase in the rate of reaction of a specified chemical reaction that the enzyme produces in a specific assay system.

A person having ordinary skill in the art recognizes the difference between enzyme activity measure in micromol per minutes and enzyme activity measures in katals. Furthermore, the present specification provides sufficient disclosure of the activation treatment described at page 11, lines 1-10, and the specific conditions of each chemical reaction described in the working examples so that enzyme activity can be calculated in katals. The determination of the enzyme activities has been carried out in the examples in the same conditions (pH, temperature) using standard activity measurements in the conditions in which the enzyme treatments of the materials have been effected.

Accordingly, it is respectfully requested that the § 112, second paragraph, of claims 22 and 40 be withdrawn.

**Response to Claim Rejections under 35 U.S.C. § 102**

Referring to page 9 of the Office Action, claims 1-6, 9-15, 22-29, 31-34 and 41 are rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent Application Publication No. 2003/0186036 (Goodell).

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

Goodell discloses quercetin and kaemferol as exemplary flavanoid redox cycling chelators. The redox cycling chelators form hydroxyl radicals via mediated Fenton chemistry which are used to oxidize organic compounds (Abstract). Goodell defines “redox cycling chelator” as a composition, which is capable of chelating a metal ion and undergoing a redox reaction with the metal ion such that the metal ion is reduced and the redox chelator is oxidized at [0062].

The redox cycling chelators of Goodell do not expressly or inherently act as modifying agents. Goodell does not disclose that the redox cycling chelators contact the oxidized fibre material and contain at least one first functional group which is compatible with the oxidized fibre material or that the redox cycling chelators are capable of providing the lignocellulosic fibre material with properties foreign to the native fibre as required in the presently claimed invention by the modifying agent. Moreover, a person having ordinary skill in the art would have to pick and choose amongst the various exemplary chelators to arrive at one of quercetin and kaemferol and such picking and choosing is not permissible for an anticipation rejection.

Goodell does not disclose a modifying agent as required in the presently claimed invention, and thus, Goodell does not anticipate the present invention.

Accordingly, withdrawal of the § 102 rejection of claims 1-6, 9-15, 22-29, 31-34 and 41 based on Goodell is respectfully requested.

Referring to page 11 of the Office Action, claims 1-6, 9-14, 23-33 and 41 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 6,136,041 (Jaschinski).

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

The presently claimed invention describes oxidizing phenolic or similar structural groups of the lignocellulosic matrix to provide an oxidized fibre material, and contacting the oxidized fibre material with a modifying agent containing at least one first functional portion, which is compatible with the oxidized fibre material.

In contrast, Jaschinski discloses oxidation for bleaching. In particular, Jaschinski discloses oxidizing bleaching chemicals which are enhanced by adding activating additives chosen among the phenanthrolines. The process of Jaschinski is based on ionic mechanisms in which colored chromophoric structures of the fiber are decomposed; however, the reactions do not result in phenoxy radical intermediates (caused by transfers of one electron) as in the present invention. Furthermore, during the oxidation of Jaschinski, aldehyde groups, to which the imine groups of phenanthroline bond chemically, are not formed on the fibers. Instead, the oxidation used in the bleaching process of Jaschinski produces only acids on the fibers.

In view of the above, Jaschinski does not expressly or impliedly describe the elements of the presently claimed invention, and therefore, it is respectfully submitted that Jaschinski does not anticipate the presently claimed invention. Accordingly, withdrawal of the § 102 rejection of claims 1-6, 9-14, 23-33 and 41 is requested.

Referring to page 12 of the Office Action, claims 1-14, 16-33, 35-39 and 41 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 6,187,136 (Pederson).

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

As disclosed on page 1 of the specification, Pederson describes a process for altering the surface charge of lignocellulosic fibres by reacting the material with an oxidase in the presence of an added phenolic carboxylic acid in order to increase the negative charge of the material. Due to the increased charge, increased binding of an ionically charged strengthening agent can be achieved.

Pederson describes a process in which the surface properties originally present in the lignocellulosic material are enhanced. However, even when new functionalities (*e.g.*, carboxyl groups) are produced, such groups are directly derived from the corresponding hydroxyl and carbonyl groups already present on the fibres and no novel functional groups are created.

In contrast, the present invention provides a way to functionalize lignocellulosic fibres which provide the fibres with native properties. Furthermore, the present invention requires a two-step-bonding of the charge or other properties as recited in the present claims which is not disclosed or suggested in Pederson.

Accordingly, withdrawal of the § 102 rejection of claims 1-14, 16-33, 35-39 and 41 based on Pederson is respectfully requested.

#### **Response to Claim Rejections under 35 U.S.C. § 103**

Referring to page 16 of the Office Action, claim 30 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Goodell.

Claim 30 recites, "The process according to claim 1, wherein radical forming radiation capable of catalyzing the oxidation of phenolic or similar structural groups is used to provide an oxidized fibre material."

Claim 30 depends from claim 1, and thus, is patentable by virtue of its dependency from claim 1 which is patentable for the reasons discussed above.

Furthermore, claim 30 is patentable because it would not have been *prima facie* obvious to substitute UV radiation for Fenton activation, as the Examiner suggests.

As discussed above, Goodell discloses quercetin and kaemferol as redox cycling chelators. The redox cycling chelators form hydroxyl radicals via mediated Fenton chemistry which are used to oxidize organic compounds (Abstract). Therefore, if UV radiation was to be substituted for Fenton activation in Goodell, a person having ordinary skill in the art would not employ quercetin and kaemferol. The Examiner alleges that quercetin and kaemferol act as modifying agents, so by not employing the compounds, Goodell would not be disclosing or suggesting each and every element of the present invention, and thus, Goodell would not render obvious present claim 30.

Accordingly, withdrawal of the § 103 rejection of claim 30 based on Goodell is respectfully requested.

Referring to page 17 of the Office Action, claims 22 and 40 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly being obvious over Pederson.

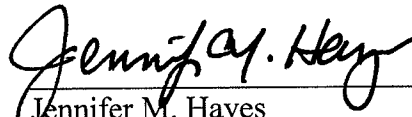
Claims 22 and 40 depends from claim 1, and thus, are patentable by virtue of their dependencies from claim 1 which is patentable for the reasons discussed above.

Accordingly, withdrawal of the § 102 rejection or, in the alternative, § 103 rejection of claims 22 and 40 based on Pederson is respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

  
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